

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application)	<u>PATENT APPLICATION</u>
Inventors: Bryers, et al.)	
Application No.: Unknown)	
Filed Date: December 21, 2001)	
Title: CROSS-BAR SWITCH WITH BANDWIDTH ALLOCATION)	Customer No.: 28554

PRELIMINARY AMENDMENT

Box Patent Application
Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Applicants respectfully request that the Examiner enter the following amendments to the above-identified patent application, which is a continuation of U.S. Patent Application Serial No. 09/900,514, assigned to Group Art Unit 2661.

AMENDMENTS

Please amend the application as follows:

In the Claims:

Please replace claims 1-38 with claims 39-74 as shown below. Applicants add new claims 39-74 and cancel claims 1-38. All pending claims are reproduced below.

39. (new) A method comprising the steps of:
- (a) recording traffic volume of packet data for a plurality of priority levels;

(b) calculating a weighted average bandwidth for each priority level in said plurality of priority levels; and

(c) determining whether to reject packet data having a first priority level in said plurality of priority levels.

40. (new) The method of claim 39, wherein said step (c) includes the steps of:

(1) determining whether an amount of packet data exceeds a first threshold; and

(2) determining whether more than one weighted average bandwidths calculated in said step (b) exceeds a first predetermined value.

41. (new) The method of claim 40, wherein said first predetermined value is 0.

42. (new) The method of claim 40, further including the step of:

(d) rejecting packet data with said first priority level, if said step (c)(1) determines that said amount of packet data exceeds said first threshold and said step (c)(2) determines that more than one weighted average bandwidth calculated in said step (b) exceeds said first predetermined value, wherein said first priority level has a highest weighted average bandwidth calculated in said step (b).

43. (new) The method of claim 42, further including the step of:

(e) determining whether to reject packet data having a secured priority level in said plurality of priority levels.

44. (new) The method of claim 43, wherein said step (e) includes the steps of:

(1) determining whether said amount of packet data exceeds a second threshold; and

(2) determining whether more than two weighted average bandwidths calculated in said step (b) exceed a second predetermined value.

45. (new) The method of claim 44, wherein said second predetermined value and said first predetermined value equal 0.

46. (new) The method of claim 44, further including the step of:

(f) rejecting packet data with said second priority level, if said step (e)(1) determines that said amount of packet data exceeds said second threshold and said step (e)(2) determines that more than two weighted average bandwidths calculated in said step (b) exceed said second predetermined value, wherein said second priority level has a second highest weighted average bandwidth calculated in said step (b).

47. (new) The method of claim 46, further including the step of:

(g) determining whether to reject packet data having a third priority level in said plurality of priority levels.

48. (new) The method of claim 47, wherein said step (g) includes the steps of:

(1) determining whether an amount of packet data exceeds a third threshold; and

(2) determining whether more than three weighted average bandwidths calculated in said step (b) exceed a third predetermined value.

49. (new) The method of claim 48, wherein said third predetermined value, said second predetermined value and said first predetermined value equal 0.

50. (new) The method of claim 48, further including the step of:

(h) rejecting packet data with said third priority level, if said step (g)(1) determines that said amount of packet data exceeds said third threshold and said step (g)(2) determines that more than three weighted average bandwidths calculated in said step (b) exceed said third predetermined value, wherein said third priority level has a third highest weighted average bandwidth calculated in said step (b).

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51. (new) The method of claim 39, wherein said step (b) includes the steps of:

(1) dividing a traffic volume recorded in said step (a) for a priority level in said plurality of priority levels by a priority weighting value for said priority level.

52. (new) The method of claim 51, wherein said traffic volume recorded in said step (a) for said priority level is a sum of traffic volume recorded in a plurality of time windows.

53. (new) The method of claim 52, wherein said plurality of time windows has 4 time windows.

54. (new) A method comprising the steps of:

(a) recording traffic volume of packet data for a plurality of priority levels;
(b) calculating a weighted average bandwidth for each priority level in said plurality of priority levels; and

(c) determining whether to reject packet data, wherein said step (c) includes the steps of:

(1) determining whether an amount of packet data exceeds a first threshold;

(2) determining whether more than one weighted average bandwidth calculated in said step (b) exceeds a predetermined value;

(3) determining whether said amount of packet data exceeds a second threshold;

(4) determining whether more than two weighted average bandwidths calculated in said step (b) exceed said predetermined value;

(5) determining whether an amount of packet data exceeds a third threshold; and

(6) determining whether more than three weighted average bandwidths calculated in said step (b) exceed said predetermined value.

55. (new) The method of claim 54, further including the step of:

(d) rejecting packet data with a first priority level, if said step (c)(1) determines that said amount of packet data exceeds said first threshold and said step (c)(2) determines that more than one weighted average bandwidth calculated in said step (b) exceeds said predetermined value, wherein said first priority level has a highest weighted average bandwidth calculated in said step (b).

56. (new) The method of claim 55, further including the step of:

(e) rejecting packet data with a second priority level, if said step (c)(3) determines that said amount of packet data exceeds said second threshold and said step (c)(4) determines that more than two weighted average bandwidths calculated in said step (b) exceed said predetermined value, wherein said second priority level has a second highest weighted average bandwidth calculated in said step (b).

57. (new) The method of claim 56, further including the step of:

(f) rejecting packet data with a third priority level, if said step (c)(5) determines that said amount of packet data exceeds said third threshold and said step (c)(6) determines that more than three weighted average bandwidths calculated in said step (b) exceed said predetermined value, wherein said third priority level has a third highest weighted average bandwidth calculated in said step (b).

58. (new) The method of claim 54, wherein said step (b) includes the steps of:

(1) dividing a traffic volume recorded in said step (a) for a priority level in said plurality of priority levels by a priority weighting value for said priority level, wherein said traffic volume recorded in said step (a) for said priority level is a sum of traffic volume recorded in a plurality of time windows.

59. (new) An apparatus comprising:

a set of input ports to receive data packets;

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a set of sink ports in communication with said set of input ports to forward said data packets, wherein a first sink port in said set of sink ports is adapted to perform a method comprising the steps of:

- (a) recording traffic volume of packet data for a plurality of priority levels;
- (b) calculating a weighted average bandwidth for each priority level in said plurality of priority levels; and
- (c) determining whether to reject packet data having a first priority level in said plurality of priority levels.

60. (new) The apparatus of claim 59, wherein said step (c) includes the steps of:

- (1) determining whether an amount of packet data exceeds a first threshold; and
- (2) determining whether more than one weighted average bandwidth calculated in said step (b) exceeds said first predetermined value.

61. (new) The apparatus of claim 60, further including the step of:

- (d) rejecting packet data with said first priority level, if said step (c)(1) determines that said amount of packet data exceeds said first threshold and said step (c)(2) determines that more than one weighted average bandwidth calculated in said step (b) exceeds said first predetermined value, wherein said first priority level has a highest weighted average bandwidth calculated in said step (b).

62. (new) The apparatus of claim 61, wherein said method includes the step of:

- (e) determining whether to reject packet data having a second priority level in said plurality of priority levels.

63. (new) The apparatus of claim 62, wherein said step (e) includes the steps of:

- (1) determining whether said amount of packet data exceeds a second threshold; and

(2) determining whether more than two weighted average bandwidths calculated in said step (b) exceed a second predetermined value.

64. (new) The apparatus of claim 63, further including the step of:

(f) rejecting packet data with a second priority level, if said step (e)(1) determines that said amount of packet data exceeds said second threshold and said step (e)(2) determines that more than two weighted average bandwidths calculated in said step (b) exceed said second predetermined value, wherein said second priority level has a second highest weighted average bandwidth calculated in said step (b).

65. (new) The apparatus of claim 64, wherein said method includes the step of:

(g) determining whether to reject packet data having a third priority level in said plurality of priority levels.

66. (new) The apparatus of claim 65, wherein said step (g) includes the steps of:

(1) determining whether an amount of packet data exceeds a third threshold; and

(2) determining whether more than three weighted average bandwidths calculated in said step (b) exceed a third predetermined value.

67. (new) The apparatus of claim 66, further including the step of:

(h) rejecting packet data with said third priority level, if said step (g)(1) determines that said amount of packet data exceeds said third threshold and said step (g)(2) determines that more than three weighted average bandwidths calculated in said step (b) exceed said third predetermined value, wherein said third priority level has a third highest weighted average bandwidth calculated in said step (b).

68. (new) The apparatus of claim 59, wherein said step (b) includes the steps of:

(1) dividing a traffic volume recorded in said step (a) for a priority level in said plurality of priority levels by a priority weighting value for said priority level.

69. (new) The apparatus of claim 68, wherein said traffic volume recorded in said step (a) for said priority level is a sum of traffic volume recorded in a plurality of time windows.

70. (new) The apparatus of claim 59, wherein each sink port in said set of sink ports is adapted to perform a method comprising said steps of:

- (j) recording traffic volume of packet data for a plurality of priority levels;
- (k) calculating a weighted average bandwidth for each priority level in said plurality of priority levels; and
- (l) determining whether to reject packet data for a priority level in said set of priority levels.

71. (new) The apparatus of 59, further including a multi-sink port coupled to said set of input ports, wherein said multi-sink port is adapted to perform a method comprising the steps of:

- (m) recording traffic volume for packet data received by said multi-sink port for a plurality of priority levels;
- (n) calculating a weighted average bandwidth for each priority level in said plurality of priority levels; and
- (o) determining whether to reject packet data for a priority level in said set of priority levels.

72. (new) The apparatus of claim 59, further including a set of data rings in communication with said set of input ports and said set of sink ports.

73. (new) The apparatus of claim 72, wherein said set of data rings couples each sink port in said set of sink ports to each input port in said set of input ports

74. (new) The apparatus of claim 59, wherein said apparatus is a cross-bar switch.

In the Specification:

Please replace the title of the above-identified patent application appearing at page 1, line 1 of the application with the title appearing below. A marked up copy of the amended title is shown in Appendix A to this Amendment.

CROSS-BAR SWITCH WITH BANDWIDTH ALLOCATION

In the Abstract:

Please replace the ABSTRACT of the above-identified patent application appearing at page 43 of the application with the ABSTRACT appearing below. A marked up copy of the amended ABSTRACT is shown in Appendix B to this Amendment.

Each sink port in a cross-bar switch provides for allocating bandwidth among data packets. Packets are assigned priority levels, and the cross-bar switch regulates bandwidth allocation for each priority level. A sink port records traffic volume for packet data of each priority level. The sink port calculates a weighted average bandwidth for each different priority level and determines whether to reject

packet data for the priority level. When the packet data collected by a sink port exceeds a threshold, the sink port rejects data packets with priority levels having excessive weighted average bandwidths.

REMARKS

Applicants respectfully submit that claims 39-74 are in order for allowance and request consideration of these claims.

The Commissioner is authorized to change any underpayment or credit any overpayment to Deposit Account No. 501826 for any matter in connection with this document.

Respectfully submitted,

Date: December 21, 2001

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APPENDIX A

The title of the patent application appearing at page 1, line 1 of the application
has been amended as follows:

CROSS-BAR SWITCH WITH BANDWIDTH ALLOCATION

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APPENDIX B

The ABSTRACT of the patent application appearing at page 43 of the application has been amended as follows:

[A cross-bar switch includes a set of input ports for receiving data packets and a set of sink ports for transmitting the received packets to identified targets. A set of data rings couples the input ports to the sink ports. Each sink port utilizes the set of data rings to simultaneously accept multiple data packets targeted to the same destination — creating a non-blocking cross-bar switch. Sink ports are also each capable of supporting multiple targets — providing the cross-bar switch with implicit multicast capability.]

Each sink port in a cross-bar switch provides for allocating bandwidth among data packets. Packets are assigned priority levels, and the cross-bar switch regulates bandwidth allocation for each priority level. A sink port records traffic volume for packet data of each priority level. The sink port calculates a weighted average bandwidth for each different priority level and determines whether to reject packet data for the priority level. When the packet data collected by a sink port exceeds a threshold, the sink port rejects data packets with priority levels having excessive weighted average bandwidths.